Institute for Empirical Research in Economics
University of Zurich

Working Paper Series
ISSN 1424-0459

Working Paper No. 458

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November 2009

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November 28, 2009

Abstract

This paper explores the labor supply effects of a large-scale policy change in the Austrian disability insurance program, which tightened eligibility criteria for men above a certain age. Using administrative data on the universe of Austrian private-sector employees, the results of difference-in-difference type regressions suggest a substantial and statistically significant decline in disability enrollment of 5-5.7 percentage points and a modest increase in employment of 1.4 to 2.7 percentage points. On the other hand, the policy change had important spillover effects into the unemployment and sickness insurance program. Specifically, the share of individuals receiving unemployment benefits increased roughly by 3 percentage points and the share receiving sickness insurance benefits by 0.6 percentage points.

Jel–Classification: H53, H55, J21, J64, J68

Keywords: Disability Insurance, Eligibility Criteria, Labor Supply, Policy Reform

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Financial support by the Austrian National Science Research Network "Labor and Welfare State" of the Austrian FWF (P15422-G05) and the Swiss National Science Foundation (PBSG1-119229) is gratefully acknowledged.

1 Introduction

Since the 1960s the labor force participation rate of males aged 55-64 in the OECD countries has decreased from 80 to 65 percent, despite considerable improvements in aggregate health. The negative effects of this trend on economic growth and public expenditure are exacerbated by falling fertility rates and a significant increase in the average life expectancy.[1] Hence, reversing the decline in labor supply of older people is a main policy priority.

The existing literature has shown that the public pension system creates strong incentives for early retirement (Gruber and Wise (1998) and Blöndal and Scarpetta (1999)), which are strongly correlated with the retirement behavior of older workers (Burtless (1986), Krueger and Pischke (1992), Samwick (1998), and Coile and Gruber (2007)). In particular, the change in the present discounted value of future pension benefits from delaying retirement by one year is negative, thereby discouraging continuation in the labor force. While old age pension incentives are an important factor in retirement behavior, in many countries the disability insurance (DI) program has become a further pathway to early retirement even before the *early* retirement age. Therefore, to effectively encourage labor force participation of older workers, reforms in the disability insurance program are needed.

This paper exploits a policy change in the eligibility criteria for DI benefits in Austria to examine how stricter disability screening of older workers close to retirement age affects their labor supply behavior. Modeled after Austria's legislation for the self-employed, since 1981 conditions to obtain disability benefits have been substantially relaxed for older private sector workers starting at age 55. Specifically, below the age threshold an individual is generally considered disabled if a medically determinable impairment reduces the ability to work by

[1] Over the past 50 years the total fertility rate has fallen from 3.2 to 1.8 children per women and the average life expectancy has increased by 10 years (OECD (2006)).

more than 50% relative to a healthy person with comparable education in *any reasonable* occupation that the individual can carry out. According to the law, an occupation is "reasonable" if it does not entail a loss of social status and there exist at least 100 jobs in the field (vacant or occupied) in Austria (Wörister (1999)). Above the age-threshold of 55 the same individual qualifies for disability benefits if the ability to work is reduce by more than 50% relative to a healthy person with comparable education in a *similar* occupation. An occupation is considered similar if manual and mental demands, amount of responsibility, posture, concentration, endurance, required care, and stress level are comparable (Wörister (1999)).

Thus, as older workers are only compared to the set of workers in their occupation and given the generosity of DI benefits (the maximum monthly pension is more than $ 3200), disability enrollment accelerates dramatically beginning at age 55. Because the eligibility age for early retirement benefits is 60 for men compared to 55 for women, disability enrollment is disproportionately high among older men. With the aim of improving the fiscal health of the public pension system, the Austrian government implemented the Structural Adjustment Act on September 1, 1996, which restricted eligibility for early retirement benefits and introduced a bonus/malus system to penalize early retirement and encourage continued labor force participation. The most important change of all, however, was a two-year increase in the age, at which conditions for DI benefits are relaxed. Because DI enrollment has been particularly high among older men, this increase took effect only for men, while eligibility conditions for women were left unaffected.

The present study relies on a difference-in-difference estimation strategy, to examine the causal impact of the Structural Adjustment Act (SAA) on the labor supply of older workers. The first objective of this paper is to determine how the more restrictive eligibility criteria for DI benefits affected employment and enrollment into the DI program. A second key question is whether the stricter

disability screening standards led to an increase in enrollment in the unemployment insurance (UI) and sickness insurance program (SI).[2] Accounting for such spillover effects is potentially important for designing effective policies. In the present context, for example, the positive employment effect of stricter DI eligibility is likely to be small, if individuals claim UI or SI benefits instead.

The data comes from the Austrian Social Security Database (ASSD), which covers the universe of private sector workers and has two attractive features. First, even when very specific control groups are considered, sample sizes are large and effects can be estimated with a high degree of precision. Second, the data records all employment, unemployment, sick leave, disability and retirement spells back to 1972, which permits to trace individuals over time and reconstruct an individual's entire labor market history.

The results from the empirical analysis suggest that enrollment in the disability insurance program responded significantly to the tightening of the eligibility criteria. Following the change in law, the share of individuals in the treatment group receiving disability benefits decreased permanently by 5.5 percentage points. The drop in disability enrollment is countered by significant spillover effects into the UI and SI program. Specifically, the estimates suggest that the SAA led to an increase in unemployment and sick leave of 3 and 0.6 percentage points, respectively. On the other hand, employment increased by approximately 2 percentage points, after the change in law became operative. Even in the absence of spillover effects, however, the SAA is unlikely to have generated larger employment effects, given the large fraction of disability applicants that are unemployed or receive sick leave benefits before claiming disability benefits. Because health eligibility criteria for disability benefits below the age threshold are more relaxed for white collar workers compared to blue collar workers, the change in eligibility

[2]Spillover effects between government programs haven been examined in other contexts by Garrett and Glied (2000), Schmidt and Sevak (2004), Bound et al. (2004), and Duggan et al. (2007).

criteria was more drastic for the latter group. Indeed, contrasting the labor force behavior of these two subgroups suggests that the decline in disability enrollment is disproportionately large among blue collar workers.

There is a substantial literature addressing the behavioral effects of disability insurance programs.[3] While several papers have estimated the elasticity of labor force participation with respect to generosity of benefits (see Parsons (1980), Bound (1989), Haveman et al. (1991) and Gruber (2000)), in this study the level of benefits remains largely constant over the sample period and what changes is the access to disability benefits. Therefore, the parameter of interest is the elasticity of labor force participation with respect to the stringency of the screening process of applicants to the disability insurance program.

This parameter has been estimated for the US by Gruber and Kubik (1997) and Autor and Duggan (2003). Gruber and Kubik (1997) study the impact of the increase in rejection rates for the DI program in the 1970s on the labor force participation of older males using variation in denial rates across states. Their main results suggests that a 10% rise in denial rates lead to 2.8% reduction in labor force non-participation among 45-64 year old males. Autor and Duggan (2003) use the liberalization of the disability determination process in 1984 and an unforseen increase in the earnings replacement rate to explore the impact of the supply of disability benefits on the labor force participation of low-skilled workers.

One problem faced by these papers is that all workers face identical program rules, making it difficult to find a suitable counterfactual. This paper circumvents this problem by exploiting a change in law that had a large effect on one group of workers while leaving nearly identical individuals completely unaffected. Moreover, since the data contains information on the entire labor market history, this paper can examine how changes in eligibility rules of one program affect

[3]For an excellent overview of the literature see Bound and Burkhauser (1999) and Autor and Duggan (2006).

enrollment into other government programs.

The papers most closely related to the present study are by De Jong et al. (2009) for the Netherlands and Karlström et al. (2008) for Sweden. De Jong et al. (2009) use a controlled experiment to examine the effects of stricter disability screening. Specifically, in 2 of the 26 Dutch regions case workers were instructed to screen applicants more intensively. Contrary to this paper, they find no evidence that stricter disability screening increases the inflow into the unemployment insurance program, even for workers aged 55 and older, who may express particular problems in finding a job. Moreover, they find that long-term absenteeism due to sickness decreases with intensified screening, while in the present paper inflow into the SI program increases after the stricter eligibility rules become effective.

Karlström et al. (2008) examine the labor supply effects of a policy change in Sweden that abolished relaxed eligibility rules for governing disability benefits for workers aged 60 and above. As a result of the reform studied by Karlström et al. (2008) having been announced 2 years prior to its implementation, there are large anticipation effects, which could potentially cause an upward bias in the estimates. In contrast, the time span between announcement and implementation of the reform examined in this paper is only a few months. While Karlström et al. (2008) also find large inflows into the UI and SI program, they find no effect on employment. In contrast, this paper finds that the SAA led to the intended increase in employment, mainly by reducing the direct exits from employment into disability.

The paper proceeds as follows. Section 2 explains the key features of the Austrian disability insurance program. Section 3 describes the policy change and derives the theoretical predictions that are tested in the data. Section 4 outlines the identification strategy. Section 5 summarizes the data and presents descriptive statistics. Section 6 presents the results. Finally, section 7 draws conclusions.

2 The Austrian Disability Insurance Program

Austria's DI program covers all active labor market participants, although different rules apply for the self-employed and civil servants. It is one of the largest social security programs in Austria and accounts for 10 percent of all social expenditures, which is equivalent to 2.5 percent of GDP (Börsch-Supan (2007)). DI benefits, which depend on the recipient's prior earnings and labor market history, are extremely generous. The average gross replacement rate is 80 percent, compared to 59 percent for the OECD countries (OECD (2007)).

Once benefits are awarded, DI beneficiaries receive monthly payments until medical recovery, death or retirement, at which point they obtain equivalent benefits from the Public Old Age Pension program. Moreover, the DI program offers vocational rehabilitation that aims to restore or improve the work capacity of the insured. The selection process for vocational rehabilitation depends on the age of the recipients. For every 100 disability beneficiaries, there are 170 individuals within the age group 20-34 who undergo vocational rehabilitation, but only four in the age group 45-59 (OECD (2003)).

Given the generosity of DI benefits and because criteria for disability classification are relaxed for the elderly, the DI program has played an important role in early retirement. In the 1990s an average of 35 per 1000 people in the age group 55-59 claimed DI benefits, which is twice the average across the OECD countries and fifteen times higher than the average of age group 35-44 (OECD (2005)). Since Austria's early retirement age is 60 for men compared to 55 for women, disability enrollment is disproportionately high among older men. In the age group 55-59 the disability inflow rate is typically five times higher for men than for women (OECD (2003)).

As a result of the large share of DI recipients between the ages 55 and 59, disabilities common to the elderly (such as musculoskeletal disorders, or back pain) account for most of the new disability awards, while – in a difference from

most other countries – mental disorders are relatively unimportant. For example, musculoskeletal disorders make up 43 percent of all awards in 1995, followed by cardiovascular disease with 14 percent and mental disorders with 13 percent (Wörister (1999)).

2.1 Eligibility Criteria and Calculation of Benefits

To be eligible for DI benefits, applicants must suffer a health impairment that will last for at least six months and must have, depending on age, accumulated between 5 and 15 insurance years. Insurance years comprise both contributing years (periods of employment, including sick leave, and maternity leave) and qualifying years (periods of unemployment, military service, or secondary education). In a difference from the US system, applicants currently in the labor force are eligible for DI benefits (see Autor and Duggan (2003)), although once benefits are awarded, earnings may not exceed a certain threshold. The rejection rate – the fraction of applicants rejected benefits – is close to 50 percent and among those who reapply around 15 percent are awarded benefits (OECD (2003)). Labor market conditions play no direct role in the award decision. But the economic environment has an indirect effect, given that during an economic downturn more people apply for disability benefits.

The calculation of DI benefits is identical to that of retirement benefits and depends on two factors, the assessment basis and the pension coefficient:

$$DI_{a,t} = \frac{(\text{pension coefficient})_{a,t}}{100} * (\text{assesment basis})_t \tag{1}$$

where $DI_{a,t}$ is the yearly disability pension for an individual of age a becoming disabled at time t. The assessment basis is determined by the average earnings of the best 15 years, after applying an earnings cap to earnings in each year.[4] To account for wage inflation, the capped earnings in each year are re-valued based on

[4]Prior to 1993, the assessment basis was equal to average earnings in the most recent 15 years.

wage adjustment factors. The pension coefficient corresponds to the percentage of the assessment basis that is received in the disability pension. It increases with the number accumulated contribution years. Specifically, when an individual has accumulated fewer than 30 contribution years, each contribution year replaces 1.9 percent of the assessment. When the number of accumulated contribution years is above 30, each contribution year below 30 replaces 1.9 percent and each contribution year above 30 replaces 1.5 percent of the assessment basis.[5] The maximum pension is 80 percent of the assessment basis (around 45 contributing years), but cannot exceed an amount of approximately $ 3200 per month.

Health eligibility criteria for DI benefits depend on age and whether the applicant is classified as a blue or white collar worker. Blue collar workers below age 55 are eligible for benefits if a medically determinable impairment causes more than 50 percent of a reduction in the ability to work relative to that of a healthy person with comparable education in *any reasonable* occupation that the individual can carry out. According to the law, an occupation is "reasonable" if it does not entail a loss of social status and there exist at least 100 jobs in the field (vacant or occupied) in Austria (Wörister (1999)), i.e. individuals are expected to be completely flexible as to changes in residence. Eligibility criteria for benefits are relaxed for white collar workers below age 55 because requirements to change occupation are lower. Specifically, conditional upon having worked in a similar occupation for 7.5 years or more in the most recent 15 years, white collar workers are classified as disabled if their ability to work has been reduced to less than 50% relative to that of a healthy person with comparable education in the *same occupational group* (*Berufsschutz*).

To eliminate legal differences with respect to the self-employed, the Austrian government relaxed DI eligibility criteria for elderly private sector workers above 55 in 1981. Specifically, elderly applicants are classified as disabled if their ability

[5]With the pension reform the 1996 numbers have been adjusted slightly to 1.83 percent for each contribution year below 30 and 1.675 percent for each contribution year above 30.

to work has been reduced to less than 50% that of a healthy person with comparable education in a *similar* occupation. An occupation is considered similar if the core requirements are identical: manual and mental demands, amount of responsibility, posture, concentration, endurance, required care, and stress level must be comparable (Wörister (1999)).

Thus, as older workers are only compared to the set of workers in their occupation (*Tätigkeitsschutz*), it is substantially easier for them to qualify for benefits. As an example, consider a server who is unable to carry dishes due to arthritis. Below the age threshold her disability application will be rejected, given that she could still work as a cashier, for example. Above the age threshold, however, she will be awarded a disability pension. As a direct consequence, disability enrollment rises significantly at and above the age threshold. The OECD reckons that the strong focus on the former occupation is the main explanation for the low employment rates of around 30 percent for men and women aged 55-64 (OECD (2005)).

3 The Structural Adjustment Act

With the aim of improving fiscal health and fostering employment among older workers, the Austrian Pension System underwent significant changes in 1993, 1996, and 2000. While the 1993 and 2000 reforms had little impact on DI eligibility, the reform in 1996 reduced disability enrollment among the elderly substantially by increasing the age threshold for easy access to DI benefits from 55 to 57.

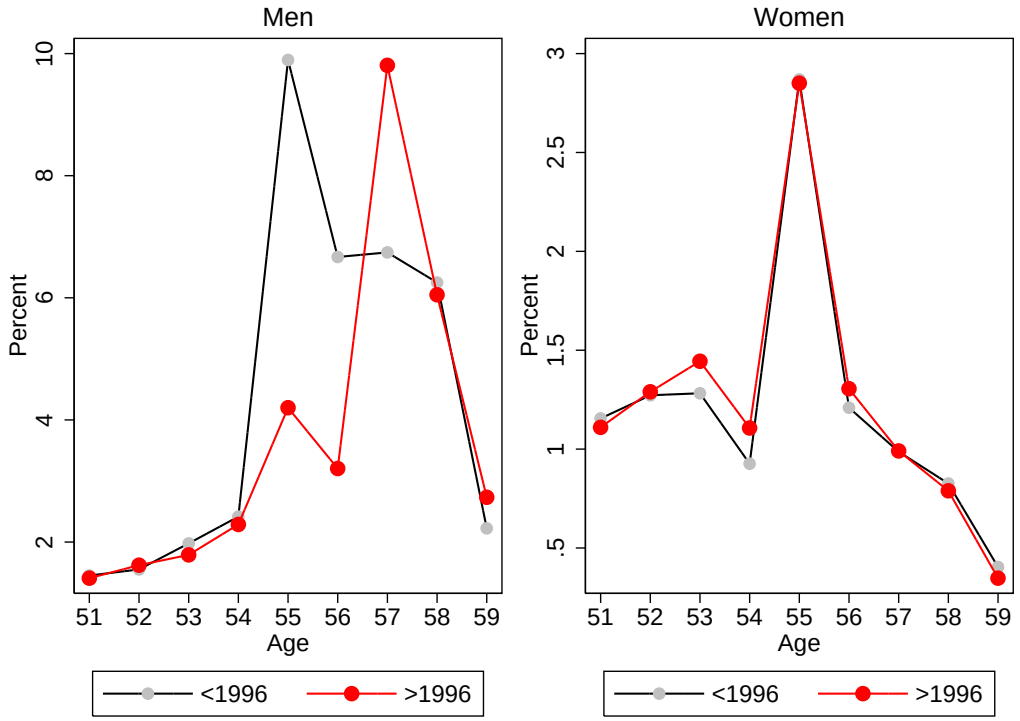
The 1993 pension reform, which became effective on July 1, introduced a bonus for retirement after the early retirement age and changed the assessment basis from the last 15 years of earnings to the highest 15 years of earnings. Given that wages generally rise with age, the later change had no effect on disability or retirement pension benefits for most individuals. The 1993 reform also introduced

a new disability pension: the early retirement pension due to reduced working capacity, which supposedly made DI benefits more accessible to workers aged 55 and older. However, given that before the reform the conditions for obtaining disability benefits had already been relaxed for individuals aged 55 and older, this change made no substantive difference in conditions for eligibility.

In May 1996 the Austrian government enacted the Structural Adjustment Act (Strukturanpassungsgesetz), which became effective on September 1, 1996. The primary objective was to cut down on expenditures in the public pension system, in order to satisfy the criteria for accession to the European Economic and Monetary Union (see Mairhuber (2003)). Specifically, the reform increased the number of contribution years required for the early retirement pension from 15 to 20, introduced a penalty for claiming benefits before the early retirement age and raised the bonus for retirement after the early retirement age. Although the new penalty for early retirement depended on age, the pension coefficient did not vary substantially with retirement age and did not represent a significant change to the pension coefficient before the 1996 reform.

The most important change of all, however, was the two-year increase in the age, at which conditions for DI benefits are relaxed. Since disability enrollment is particularly high among older men, this increase only applied to men, while leaving eligibility conditions for women unaffected. The consequences of this policy change are seen in Figure 1, which plots the share of newcomers to the disability rolls by age for men (left panel) and women (right panel) before and after the policy change. As the Figure shows, in the period January 1994 to August 1996 disability take-up for men and women peaked at age 55. Following the 1996 reform, the disability take-up rate for men at age 55 fell by 6 percentage points and increased by 3 percentage points at age 57. For the other ages as well as for women there is no significant change in the age distribution of newcomers to the disability rolls. Given that below age 55 conditions to be eligible for DI benefits are already relaxed for white collar workers, the reform is likely to have

Figure 1: New enrolles to the DI program by age and gender



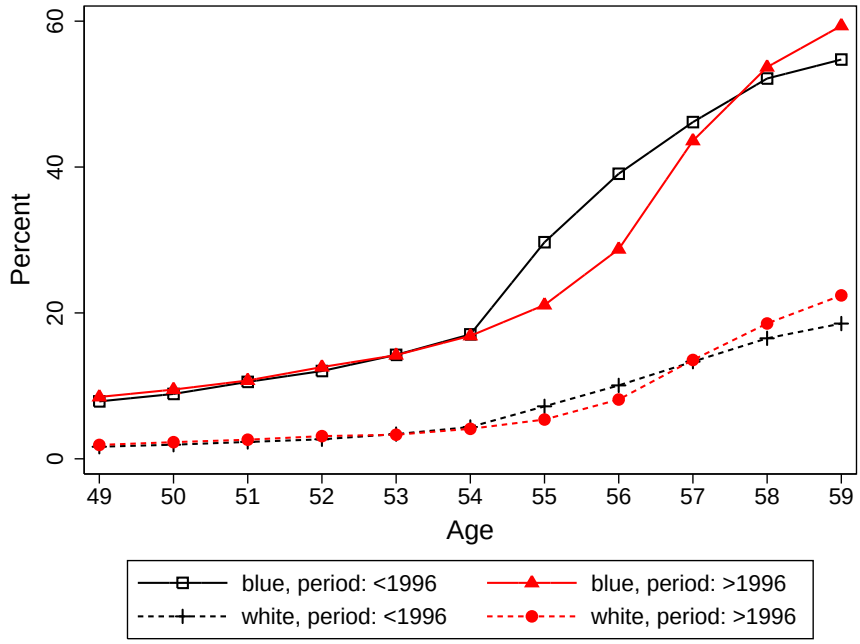
Notes: This Figure shows the distribution of new enrolles to the DI program by age and gender before (January 1994- August 1996) and after (September 1996-December 1999) the 1996 reform.

a smaller impact for this group. Figure 2 shows the age distribution of new DI enrollees for blue and white collar workers before and after the implementation of the 1996 reform. Clearly, for blue collar workers there is a sizeable decline in disability take-up at age 55 and 56 while white collar workers experience a much smaller drop.

On May 23, 2000, the European Court of Justice ruled that different DI eligibility criteria for men and women would violate EU law. Therefore, on July 1, 2000, the Austrian government set the age at which conditions for disability benefits are relaxed to 57 for both men and women. The 2000 pension reform also gradually increased the minimum retirement age from 55 to 56.5 for women and from 60 to 61.5 for men and raised the penalty for early retirement and the bonus for retirement after the statutory retirement age. Specifically, the pension

coefficient used in the disability pension is reduced relative to that of the old-age pension. The reduction in the disability pension coefficient is based on insurance years with lower insurance years receiving larger reductions.

Figure 2: New enrolles to the DI program by age for blue and white collar workers



Notes: This Figure shows the distribution of new enrolles to the DI program by age for blue and white collar workers before (January 1994- August 1996) and after (September 1996-December 1999) the 1996 reform.

3.1 Possible Labor Supply Effects of the SAA

By tightening eligibility criteria, the 1996 Structural Adjustment Act decreased the supply of disability benefits for older male workers aged 55 and 56. Using administrative data from Austria, the goal of this paper is to examine the impact of this procedural change impact on the labor supply of affected workers. We can distinguish three different groups: (1) individuals that do not meet the relaxed conditions for DI benefits, either because of their health status or work history, (2) individuals that meet the stricter eligibility criteria, and (3) individuals that qualify for DI benefits under the relaxed eligibility criteria but do not under

the strict criteria. The policy change has the biggest impact for individuals in group (3). However, given that the medical screening process is imperfect, even individuals in group (1) and (2) may change their labor supply behavior.

In addition to the disability insurance program the UI and SI program provide income replacement in the case of a separation from the labor market for economic or health reasons. These programs may influence the individuals' response to changes in the DI program. This aspect is particularly relevant in Austria, given the poor labor market prospects of older workers that are still capable of working. Wörister (1999), for example, argues that the relaxed eligibility criteria for DI benefits for older workers reduces the unemployment rate for this age group substantially.

The basic theory of how disability screening affects the labor supply of older workers is presented in Diamond and Sheshinski (1995) and Autor and Duggan (2003). Stricter eligibility criteria affect the labor supply behavior of individuals by reducing the probability p of being awarded benefits. For an employed individual a reduction in p decreases the value of applying for disability benefits relative to continuing to work. Hence, there should be less direct exits from employment to disability because (1) fewer people are awarded benefits and (2) the number of applicants decreases due to self-screening (see Parsons (1991)). However, employed workers that are no longer eligible for DI benefits under the relaxed rules may seek UI or SI benefits instead, thereby reducing the positive effect on employment. The net effect on employment is thus unclear.

In addition to an increase in the number of employed workers applying for UI and SI benefits, stricter eligibility criteria are likely to reduce the share of UI or SI recipients who seek DI benefits. Moreover, affected individuals need to wait only two years (one year for men aged 56) before they reach the new eligibility age at which conditions to be classified as disabled are relaxed. Taken together, we expect to observe an increase in the UI and SI rate after the policy reform because (1) there are less transitions from these programs into DI and (2) the

persistence in UI and SI is likely to increase. Finally, as suggested by Figure 2, the effects of the SAA are expected to be larger for blue collar relative to white collar workers.

4 Empirical Strategy

The empirical strategy to evaluate the 1996 policy reform relies on a difference-in-difference (DD) approach. The first difference is over time, as access to disability benefits became stricter after 1996. The second difference is across groups; only men aged 55 and 56 were directly affected by the new disability screening rules. These individuals define the treated group. The definition of the comparison group is crucial, as it should capture labor market trends in the absence of the policy change. There are two alternative control groups that can be used to estimate the counterfactual effects of the 1996 reform: (1) women aged 55 and 56 and (2) men younger than 55. The empirical analysis will rely on men younger than 55 as control group.

Group (1) is an inadequate control group for several reasons. First, over the period under consideration the labor force participation of older women generally increased. Thus, even in the absence of the policy change, trends in employment differ by gender. Second, since the early retirement age for women is 55, the labor supply behavior of older women is affected by changes in the early retirement rules. Specifically, the 1996 pension reform raised the number contribution years needed to qualify for early retirement from 15 to 20, thereby restricting access to early retirement benefits substantially.

People in group (2) are unlikely to change their labor supply behavior as a consequence of the Structural Adjustment Act. However, there is one concern when using group (2) as comparison group. Since, for this group, eligibility criteria for disability benefits are stricter, the inflow into disability is expected to vary less with the business cycle. Hence, trends in disability enrollment may

differ compared to the treatment group even in the absence of the policy change. To shed light on this concern, the difference-in-difference identification strategy includes pre-treatment interaction terms, which will capture different labor supply tendencies between the treatment and control group prior to the policy change.

The difference-in-difference comparison is implemented by estimating regressions of the following type:

$$y_{it} = \alpha + \beta\ Age_{it} + \delta(Post_t \times Age_{it}) + \sum_j \gamma_j \lambda_j + \theta\ \mathbf{x_{it}} + \varepsilon_{it} \qquad (2)$$

where i denotes individual, a age and t time; y_{iat} is the outcome variable of interest; Age is a dummy for treatment group (1 if treatment, 0 if control) to control for group-specific trends; and $Post$ is a dummy which is 0 before August 1996 and 1 after August 1996. The λ_j's are quarter or year fixed effects, depending on the specification, to control for changes in macroeconomic conditions. The vector x_{iat} is a set of individual specific characteristics to control for any observable differences that might confound the analysis (blue–collar status, experience, number of contribution months, previous annual earnings, average earnings over the best 15 years, industry and region dummies). The coefficient of interest is δ, which measures the effect of stricter DI eligibility criteria on the treated group relative to the comparison group, using variation over time. To explore the impact of the policy reform over time, equation (2) is generalized by including a full set of treatment $\times$ quarter or year interaction terms:

$$y_{it} = \alpha + \beta\ Age_{it} + \sum_j \delta_j(\lambda_j \times Age_{ij}) + \sum_j \gamma_j \lambda_j + \theta\ \mathbf{x_{it}} + \varepsilon_{it} \qquad (3)$$

The coefficients of interest are the deltas. The pre 1996 interaction terms provide "pretreatment" specification test, although they may capture possible anticipation effects. Equation (2) and (3) are estimated for men aged 49-50, 51-52, and 53-54 as comparison groups. The identifying assumption is that there are no unobserved age-group-specific changes that (1) are correlated with the policy change and (2) are correlated with age-group-specific changes in the outcome variable.

Several outcome variables are examined. The first set of regressions analyzes the impact of the policy reform on levels of disability, unemployment, sick leave, employment, and the residual category (containing those that are not employed, unemployed, disabled, nor receiving SI). The outcome variable is a dummy, which is equal to 1 if an individual is the state of interest at time and 0 otherwise. Since blue and white collar workers generally differ with respect to their eligibility criteria for DI benefits, effects for these two groups are examined separately. The second set of regressions studies the impact of the policy change on transitions between different states, thereby allowing for a more detailed picture of the labor supply effects triggered by the SAA. Three sets of transitions are analyzed: (1) from employment to all other states, (2) from unemployment to all other states, and (3) from the sickness insurance program to all other states. The dependent variable is a dummy that is equal to 1 if an individual switched from state i to state j – the state under study – and 0 if the individual is still in state i or switched to some other state $k \neq j$.

5 Data and Descriptive Statistics

The data comes from the Austrian Social Security Database (ASSD), which contains detailed information on the labor market and earnings history of individuals back to 1972 as well as some firm-specific information such as region and industry affiliation.[6] The work history is summarized by spells. Specifically, all employment, unemployment, disability, sick leave and retirement spells are recorded. Employment spells are bound to individual employers. For example, accepting a new job in another firm starts a new spell, while a change of occupation within the same firm does not. At the individual level the data also contains information on gender, age, experience, tenure, blue collar or white collar status, and the number of contribution and insurance years.

[6]For a detailed description of the data see Zweimüller et al. (2009).

The main sample consists of all men aged 49-56 over the period 1991 to 2002 (birth cohorts 1930 to 1953) working in Austria. Individuals are observed on a quarterly basis for approximately 5 1/2 years before the implementation of the SAA (January 1991 to August 1996) and a period of about 6 1/2 years (September 1996 to December 2002) when the stricter DI eligibility criteria were in effect. However, the main focus of the analysis lies on the years 1994 to 1999, given that both in 1993 and 2000 significant policy reforms became effective, which potentially had an impact on labor supply.

The sample restrictions are as follows. First, all individuals who spent more than a year self-employed or as public servants are excluded as they are covered by a different pension system. In particular, public employees have relaxed eligibility conditions for disability benefits at all ages, which results in a high level of disability enrollment even at lower ages. Second, in order to isolate the effects of stricter eligibility criteria, the focus lies on individuals with at least five contribution years, which are likely to satisfy the non-medical eligibility criteria for disability benefits.

Table 1 reports summary statistics for the treatment group and the potential control groups "men aged 49-50", "men aged 51-52", and "men aged 53-54" both before September 1996 and after September 1996. Except for the number of contribution years (and therefore disability benefits), there are minor differences between the different age groups with respect to observable characteristics. A comparison of the fraction of individuals in the different labor market states before and after the 1996 reform provides the first evidence on the impact of the policy change. Specifically, in the treatment group, relative to the control groups, the rate of disability declines considerably after the SAA became effective. Paralleling this decline, there is a substantial increase in the unemployment rate. Similarly, we observe an increase in the sick leave and employment rate, while the residual category is unchanged.

Table 1: Treatment and control group characteristics

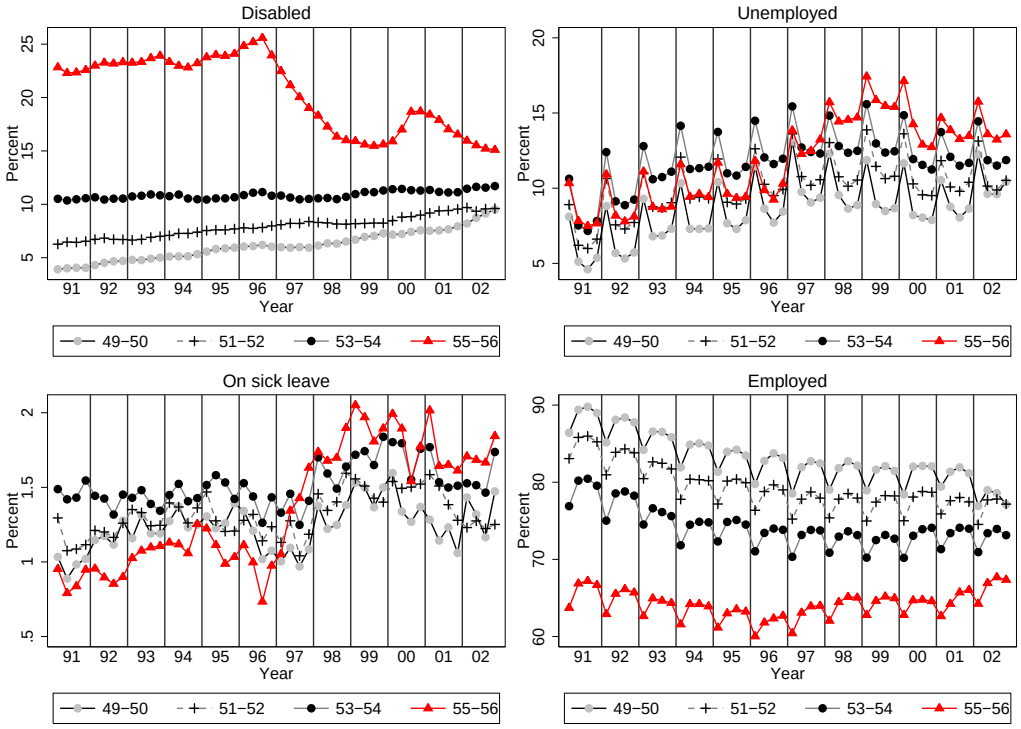
	Ages 49-50		Ages 51-52		Ages 53-54		Ages 55-56	
	Before	After	Before	After	Before	After	Before	After
Disabled	5.63	6.35	7.52	8.20	10.73	10.76	24.05	18.36
	(23.04)	(24.39)	(26.38)	(27.44)	(30.95)	(30.98)	(42.74)	(38.72)
Unemployed	8.47	9.82	10.16	11.26	12.12	13.14	10.09	14.23
	(27.85)	(29.76)	(30.22)	(31.61)	(32.64)	(33.78)	(30.11)	(34.93)
Sick leave	1.26	1.24	1.30	1.36	1.46	1.54	1.06	1.62
	(11.16)	(11.07)	(11.33)	(11.57)	(12.01)	(12.33)	(10.26)	(12.61)
Employed	83.31	81.45	79.21	77.49	73.77	72.65	62.62	63.70
	(37.29)	(38.87)	(40.58)	(41.76)	(43.99)	(44.58)	(48.38)	(48.09)
Residual	1.33	1.14	1.80	1.69	1.92	1.92	2.18	2.09
	(11.45)	(10.60)	(13.28)	(12.90)	(13.71)	(13.72)	(14.60)	(14.32)
Blue	59.35	62.33	57.62	60.90	58.82	58.64	61.48	58.79
	(49.12)	(48.46)	(49.42)	(48.80)	(49.22)	(49.25)	(48.42)	(49.22)
Exp	13.31	13.15	13.25	12.97	13.16	12.82	12.87	12.59
	(3.14)	(3.33)	(3.19)	(3.46)	(3.17)	(3.55)	(3.29)	(3.62)
Cont. yrs	12.20	13.66	14.00	13.96	15.76	15.48	17.05	17.00
	(3.91)	(5.82)	(4.34)	(4.09)	(4.63)	(4.53)	(5.01)	(4.89)
Wage	30,150	31,464	30,126	31,300	29,884	31,432	28,831	31,392
	(45,082)	(69,382)	(53,448)	(50,772)	(68,734)	(50,809)	(60,311)	(69,593)
Wage 15yrs	20,466	20,471	21,017	21,059	21,218	21,609	21,071	21,901
	(5,885)	(5,899)	(6,059)	(6,186)	(6,103)	(6,362)	(6,178)	(6,428)
Individuals	39,874	38,010	29,160	24,650	31,222	25,931	29,502	29,749
Observations	259,262	298,883	307,287	302,458	331,556	326,023	314,329	371,592

Notes: Before refers to the period January 1994 to August 1996. After denotes the period September 1996 to December 1999. Blue is 1 for blue collar workers and 0 for white collar workers. Exp. 15yrs denotes experience in the last 15 years and cont. yrs is the total number of years contributing to the pension system. Wage 15yrs is the average wage over the best 15 years. Wage and Wage 15yrs are in €1,000.

5.1 Graphical analysis

To assess the impact of the change in disability eligibility criteria graphically, Figure 3 plots labor supply trends in men for the age groups 49-50, 51-52, 53-54, and 55-56 over time. As shown in the top left subfigure, after the change in law the fraction of disabled individuals in the age group 55-56 starts to decline by almost 10 percentage points and stays fairly constant at the new level of 15 percent. Over the same period of time, the fraction of disability beneficiaries in the other age groups increases only slightly or remains constant.

Figure 3: Effects of the 1996 policy reform by year and age group



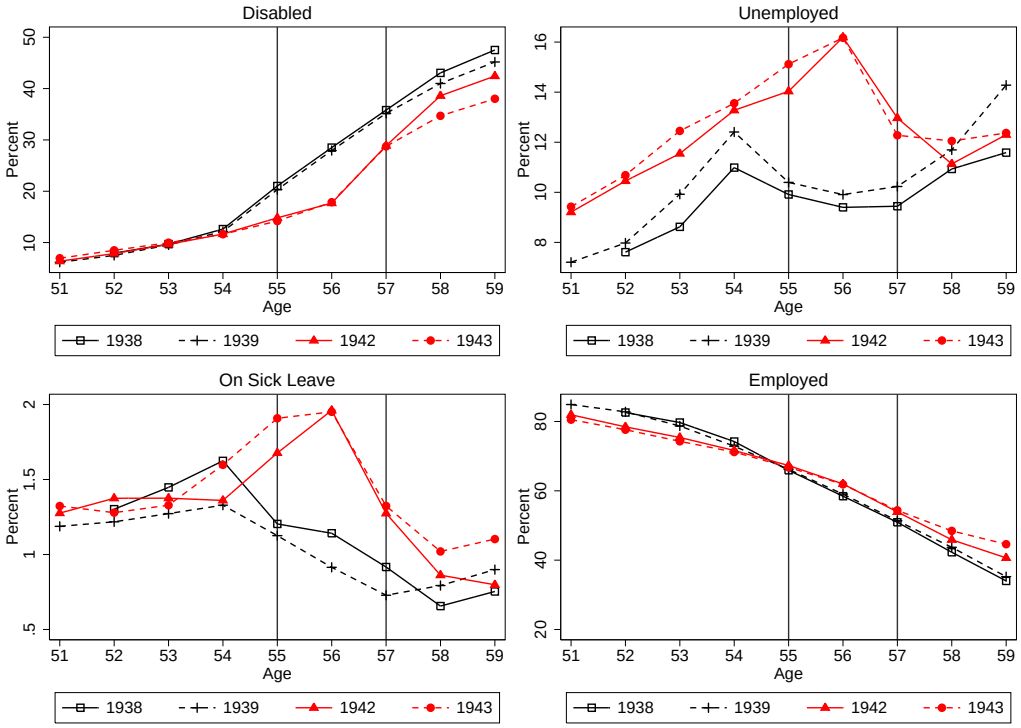
Notes: This Figure shows labor supply trends for men by quarter and age group over the period 1991 to 2002.

The top right subfigure in Figure 3 reports changes in unemployment for the different groups. The strong seasonal fluctuation in unemployment in Austria is well-documented and is mainly driven by the construction and tourism sector (Del Bono and Weber (2008)). In the years following the policy change the

unemployment rate of the treatment group starts rising by roughly 7 percentage points reaching a maximum of 16 percent. For the comparison groups, on the other hand, the unemployment rate increases only slightly. A similar pattern can be observed for the SI rate (bottom left panel). For the age group 55-56 enrollment into the SI program starts growing by around 2 percentage points immediately after the reform. Interestingly, there is a drop in the SI rate in the quarter before the reform, possibly indicating anticipation effects. However, since the reform was made public only in May of 1996 and enacted in September of the same year, anticipation effects are expected to have been small. This conjecture is confirmed by the fact that no major increase in disability can be seen for the treatment group in the year of the policy change. Finally, the bottom right panel reports trends in employment for the different age groups. Despite the large absorption effects by the UI and SI programs, employment in the treatment group clearly increases after the policy change took effect.

A look at different cohorts provides further evidence on the effects of the increase in the age at which eligibility criteria are relaxed. Figure 4 reports labor status by age for the birth cohorts 1938 and 1939, which were unaffected by the reform, and the birth cohorts 1941 and 1942, which were fully affected by the reform. The top left panel shows that among the affected birth cohorts significantly fewer people receive disability benefits at ages 55 and 56. At age 57 disability enrollment starts to catch up, but remains below the level of the unaffected birth cohorts. This finding is also reflected in the patterns of unemployment (top right panel) and SI enrollment (bottom left panel). Both are significantly higher at ages 55 and 56 for the affected cohorts and drop considerably at age 57. Finally, as reported in the bottom right subfigure, there is a permanent increase in employment at age 55 for the affected birth cohorts. Hence, although some individuals merely postponed their application for disability benefits by two years, the SAA permanently reduced disability enrollment and increased employment among men aged 55 and older.

Figure 4: Effects of the 1996 Policy reform by age and year-of-birth



Notes: This Figure shows labor supply trends for men by year-of-birth and age. The vertical lines denote the eligibility ages, at which conditions for disability benefits are relaxed, before (age 55) and after (age 57) the SAA became effective.

6 Results

The results are presented in four subsections. The first subsection examines the effects of the 1996 reform on the level of disability, unemployment, sick leave, employment, and the residual category. The second subsection separately analyzes the impact for blue and white collar workers. The third subsection examines binary transitions from employment, unemployment, and sick leave to other labor force states. The fourth subsection discusses the effects of the SAA on government expenditures.

6.1 Overall Labor Supply Effects

The first main set of results is summarized in table 2, which shows the OLS estimates of equation (2) for different dependent variables. The time period analyzed is 1994 to 1999. Columns (1) to (3) indicate that the change in eligibility criteria for disability benefits led to a marked decline of 5 to 5.7 percentage points, depending on the comparison group, in the share of disability beneficiaries. As shown in columns (4) to (6), the direct consequence of the decline in disability enrollment was an increase in unemployment of 2.3 to 3.1 percentage points. Similarly, there is a significant increase in the SI rate of around 0.6 percentage points, after the SAA is implemented (columns (7) to (9) right part). As shown in columns (10) to (12) of table 2, in spite of the spillover effects to the UI and the SI program, employment increased by 1.4 to 2.7 percentage points. Finally, column (1) to (3) in the table 5 in the appendix indicate that the policy change had no effect on the size of the residual category (containing those that are not employed, unemployed, disabled, nor receiving SI). This result is not surprising, given that all individuals in the sample have at least five contribution years and are therefore likely to qualify for either UI or SI benefits.

Table 2: Overall labor supply effects of the SAA

	Disability			Unemployment			Sick leave			Employment		
	49-50	51-52	53-54	49-50	51-52	53-54	49-50	51-52	53-54	49-50	51-52	53-54
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post*Age	-0.057***	-0.055***	-0.050***	0.023***	0.030***	0.031***	0.007***	0.006***	0.005***	0.027***	0.019***	0.014***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Age	0.154***	0.133***	0.109***	0.001	-0.016***	-0.032***	-0.004***	-0.004***	-0.005***	-0.157***	-0.114***	-0.073***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)
Cont. yrs	0.003**	0.008***	0.016***	-0.007***	-0.005***	-0.003*	0.003***	0.004***	0.003***	0.002	-0.005***	-0.014***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)
Wage	-0.001***	-0.001***	-0.001*	0.000	0.000	0.000	-0.000**	-0.000**	-0.000	0.000	0.000	0.000
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wage 15yrs	-0.009***	-0.006***	-0.004*	-0.004***	-0.003**	-0.002	-0.004***	-0.004***	-0.004***	0.009***	0.004**	-0.001
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)
Blue	0.055***	0.057***	0.061***	0.000	0.001	-0.000	0.013***	0.013***	0.015***	-0.057***	-0.061***	-0.066***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)
Exp	0.581***	0.638***	0.672***	0.518***	0.566***	0.638***	0.049***	0.049***	0.052***	-0.909***	-1.000***	-1.123***
	(0.016)	(0.017)	(0.019)	(0.014)	(0.014)	(0.016)	(0.002)	(0.002)	(0.002)	(0.012)	(0.012)	(0.014)
Exp^2	-0.516***	-0.554***	-0.585***	-0.416***	-0.442***	-0.481***	-0.028***	-0.027***	-0.027***	0.877***	0.933***	1.011***
	(0.008)	(0.008)	(0.009)	(0.007)	(0.007)	(0.008)	(0.001)	(0.001)	(0.001)	(0.006)	(0.007)	(0.007)
R^2	0.277	0.275	0.274	0.141	0.14	0.143	0.009	0.009	0.01	0.476	0.476	0.486
Obs.	1,244,066	1,295,666	1,343,500	1,244,066	1,295,666	1,343,500	1,244,066	1,295,666	1,343,500	1,244,066	1,295,666	1,343,500

Notes: The table reports coefficients from a linear probability model. Standard errors in parentheses account for clustering of individual level observations. All models include industry, region and quarter dummies. Cont. yrs. indicates the number of contribution years to the pension system. Experience (Exp) is right-censored at 15 years. Wage 15yrs is the average wage over the best 15 years. Wage and Wage 15yrs are measured in €1,000. The time period is 1994-1999. Significance levels: *** = 1%, ** = 5%, * = 10%.

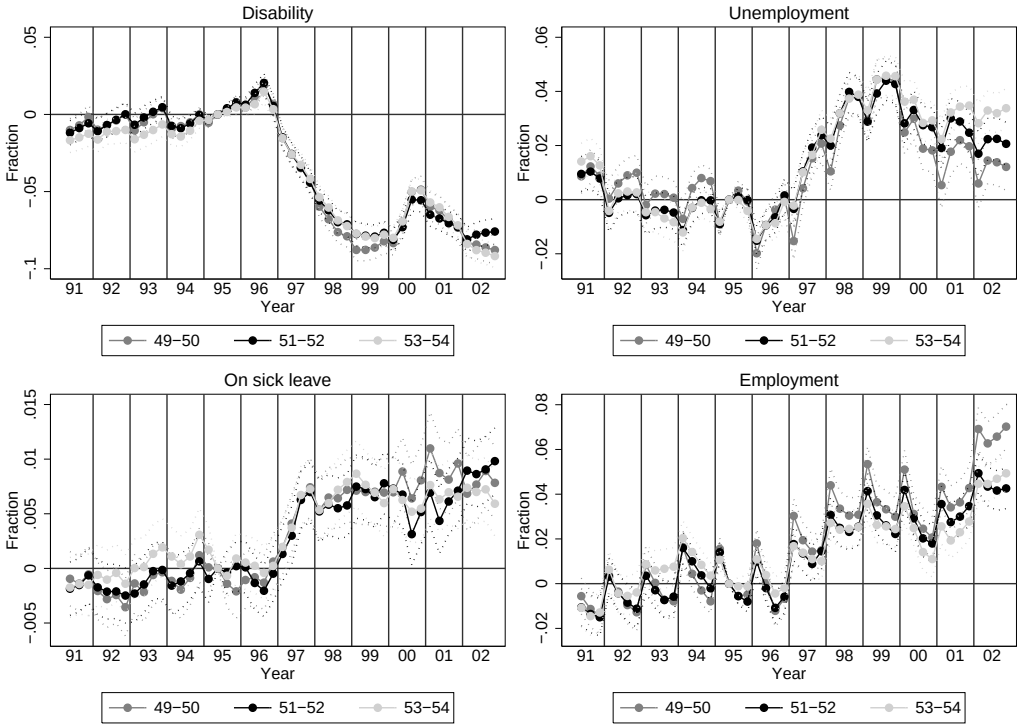
The estimates presented in tables 2 will be biased if the treatment group and the comparison group have different labor supply tendencies. To shed light on this concern, Figure 5 plots the estimated coefficients on the interaction terms (equation (3)) for each of the three control groups over the full sample period 1991–2002. Each dot on the solid line is the coefficient of the interaction between an indicator variable for quarter and treatment (a 95-percent confidence interval is plotted by dotted lines). As shown in the top left panel, coefficients for disability fluctuate around 0 before 1996 and turn significantly negative after 1996. The estimated decrease is persistent over time and comparable across different control groups. There is some evidence for an anticipation effect in the second quarter of 1996. However, since the reform was only announced in May 1996, individuals had little time to adjust their behavior. That is, to apply for DI benefits before the change in law became effective.

The top right and bottom left panels indicate that the decline in disability enrollment led to a large increase in the UI and, to a lesser extent, in the SI rate, thereby providing evidence that these programs act partly as substitutes for the DI program. In spite of these absorbtion effects, there is a substantial increase in employment, as shown in the bottom right panel of figure 5. This result highlights the role of the disability insurance for early retirement in Austria. Apparently, a large fraction of older workers seek DI benefits to retire early and not because they are truly disabled. The small penalty for claiming disability benefits before the early retirement age further contributed to this trend.

6.2 Blue versus White Collar

Because health eligibility criteria for disability benefits below the age threshold are more relaxed for white collar workers relative to blue collar workers, it is instructive to examine labor supply effects for these two groups separately. Table 3 presents estimates of equation (2) for blue and white collar workers separately.

Figure 5: Overall effects: quarter × treatment interaction terms



Notes: This Figure shows coefficients of the quarter × treatment interactions in equation (3) for transitions from sick leave. Dotted lines denote a 95-percent confidence interval.

Column (1) to (3) indicate that the reduction in disability was disproportionately large among blue collar workers. For this group disability enrollment decreased in the order of 7.3 to 8.6 percentage points, compared to a decline of 1 to 1.4 percentage points for white collar workers.

Table 3: Overall labor supply effects of the SAA

	Disability			Unemployment			Sick leave			Employment		
	49-50	51-52	53-54	49-50	51-52	53-54	49-50	51-52	53-54	49-50	51-52	53-54
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Blue collar												
Post*Age	-0.086***	-0.083***	-0.073***	0.028***	0.040***	0.044***	0.010***	0.009***	0.007***	0.046***	0.033***	0.022***
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)	(0.004)	(0.003)
Age	0.214***	0.187***	0.154***	-0.012***	-0.032***	-0.053***	-0.006***	-0.007***	-0.008***	-0.201***	-0.147***	-0.093***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)
R^2	0.288	0.281	0.274	0.127	0.122	0.123	0.007	0.007	0.008	0.464	0.455	0.460
Obs.	746,878	767,252	791,398	746,878	767,252	791,398	746,878	767,252	791,398	746,878	767,252	791,398
White collar												
Post*Age	-0.013***	-0.014***	-0.010***	0.014***	0.015***	0.010***	0.002***	0.002***	0.002***	-0.001	-0.001	0.000
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.003)
Age	0.054***	0.047***	0.037***	0.029***	0.015***	0.004**	-0.001*	-0.001***	-0.001***	-0.091***	-0.067***	-0.044***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.002)
R^2	0.147	0.149	0.152	0.177	0.182	0.190	0.005	0.004	0.004	0.409	0.417	0.429
Obs.	497,188	528,414	552,102	497,188	528,414	552,102	497,188	528,414	552,102	497,188	528,414	552,102

Notes: The table reports coefficients from a linear probability model. Standard errors in parentheses account for clustering of individual level observations. All models control for number of contribution years, experience (and its squares), wage, average wage over the best 15 years, industry, region and time. The time period is 1994-1999. Significance levels: *** = 1%, ** = 5%, * = 10%.

For white collar workers the decline in disability is completely absorbed by an increase in the inflow into the UI and SI program, but had no effect on employment nor, as shown in table 5, on the residual category. Although for blue collar workers there is also a sizeable substitution effect from disability into unemployment and the sickness insurance program, employment increases by 2.2 to 4.6 percentage points after the reform became effective. As for white collar workers, there is no effect on the residual category (table 5).

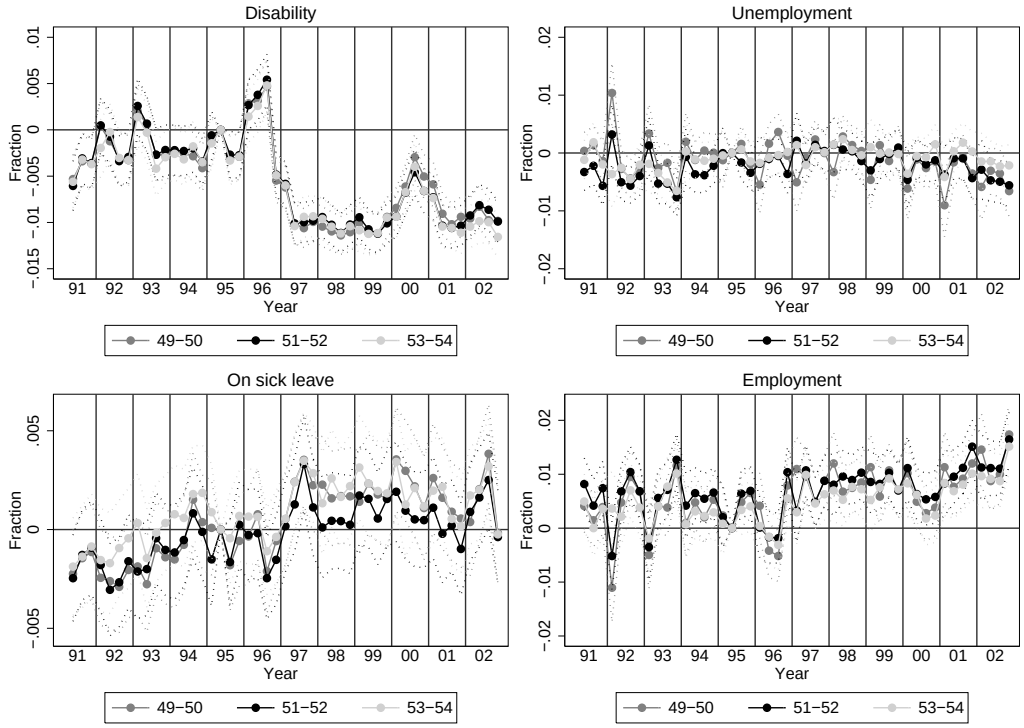
These findings suggest that white collar workers who seek DI benefits do so because they cannot continue working as a result of either health status or difficulty in finding work. Thus, the whole decline in disability enrollment is absorbed by the UI or SI program. In contrast, blue collar workers seem to use the DI program to some extent as a gateway for early retirement and, as a consequence of the tightening in eligibility criteria, decided to remain in employment.

6.3 Transitions across Labor Force States

The overall effects discussed in the previous section can of course either be the results of changes in the inflow into a certain state; or changes in the persistence in a certain state; or both. To shed light on the importance of these two effects, the third subsection examines binary transitions from and persistence in employment, unemployment, and sick leave. Disability is considered an absorbing state, given that only a small number of disability beneficiaries return to the labor force.

The first set of results is shown in Figure 6, which plots the estimated coefficients on the quarter $\times$ treatment interaction terms of equation (3) for transitions from and persistence in employment for all three comparison groups. A 95-percent confidence interval is plotted with dotted lines. The top left subfigure suggest that the SAA led to decrease in direct exits from the labor market of approximately 1 percentage point per quarter. There is evidence for an anticipation effect, given that the estimated probability of a transition from disability to

Figure 6: Transitions from employment: quarter × treatment interaction terms



Notes: This Figure shows coefficients of the quarter × treatment interactions in equation (3) for transitions from employment. Dotted lines denote a 95-percent confidence interval.

employment is positive and significant just prior to the reform.

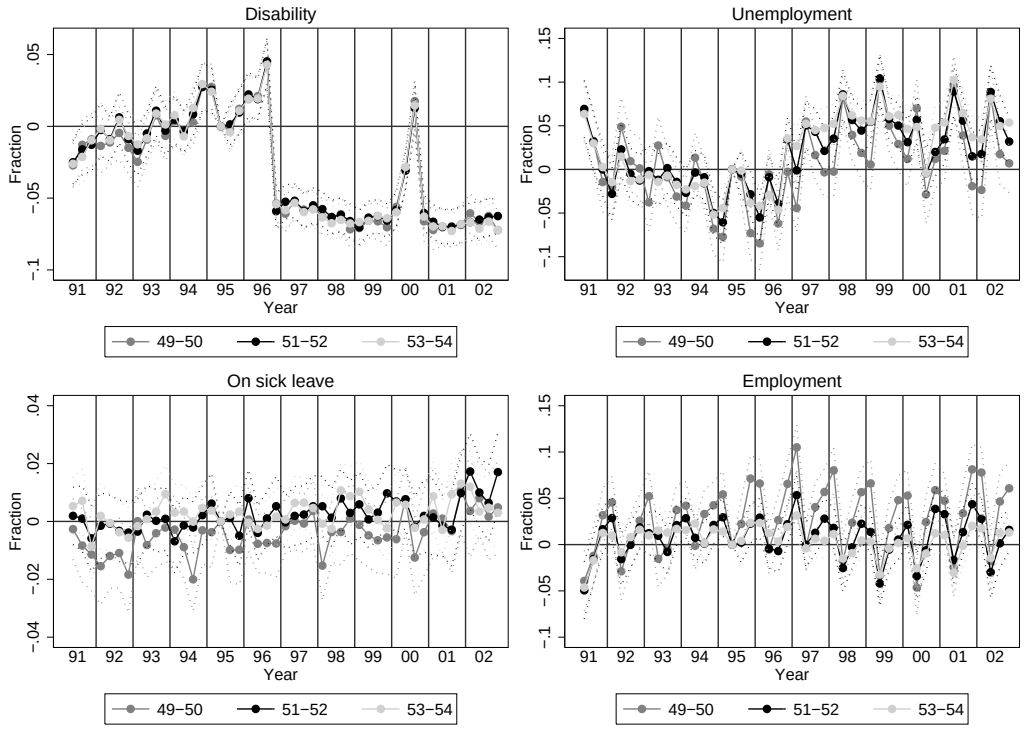
As shown in the top right subfigure, there is little evidence that the policy reform had an effect on the transition rate from employment to unemployment. On the other hand, employed workers are more likely to seek SI benefits after the change in the law (bottom left panel). However, this effect is not significantly different from 0 in most cases. Finally, the bottom right panel suggests that the persistence in employment increased after the change in law.

The estimated interaction term coefficients for transitions from and persistence in unemployment are summarized in Figure 7. The top left subfigure suggests a substantial and significant decline in the probability of a transition from unemployment to disability after the policy reform is in effect, with little evidence of a preexisting trend. However, as in the case of employment, there

is an increase in the number of transitions from unemployment to disability just prior to the reform, suggesting some anticipation behavior.

The drop in the number of transitions from unemployment to disability is persistent over time and larger in magnitude than the estimated decline for employment, which is consistent with Autor and Duggan (2003). Using a dynamic programming model, Autor and Duggan (2003) show that the response to changes in DI screening stringency is relatively elastic for the unemployed because they face low opportunity costs of exiting the labor force to seek benefits. By contrast, direct employment to disability transitions are relatively inelastic.

Figure 7: Transitions from unemployment: quarter × treatment interaction terms



Notes: This Figure shows coefficients of the quarter × treatment interactions in equation (3) for transitions from unemployment. Dotted lines denote a 95-percent confidence interval.

The top right subfigure shows after the change in the law the persistence in unemployment in the affected group increased relative to all comparison groups. On the other hand, as shown in the bottom panels, the stricter eligibility rules

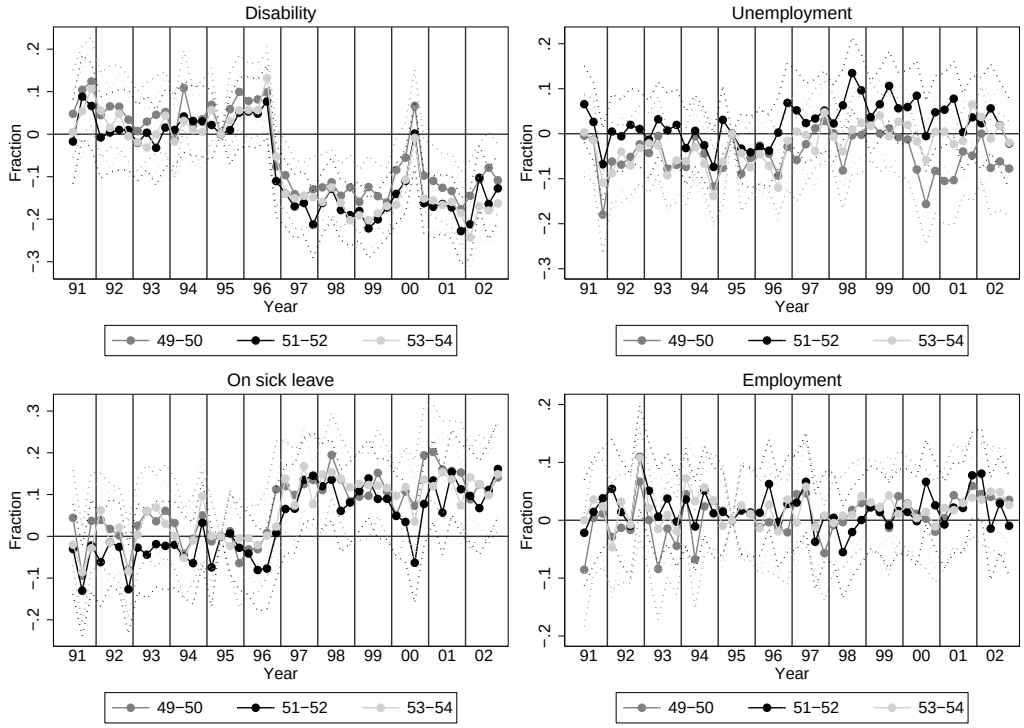
for disability benefits had no effect on transitions from the UI to the SI program or into employment. The drop in the number of transitions from unemployment to disability and the increased persistence in unemployment highlight the role of the DI program in reducing measured unemployment.

The last set of results, summarized in Figure 8 explores transitions from sick leave into other states. The probability of a transition from sick leave to disability drops after the Structural Adjustment Act becomes effective (top left panel). On the other hand, as displayed in the bottom left subfigure, there is a sizeable and of the same magnitude there is a significant increase in the persistence of sick leave. Lastly, the top and the bottom right panel indicate that the change in law had no effect on transitions to unemployment or employment.

In net, the findings from the analysis of binary transitions between labor force states suggest that the decline in disability enrollment documented in table 2 is the result of a reduction in the inflow rate from employment, unemployment, and sick leave. As a direct consequence, the persistence in employment increased providing evidence that the DI program serves, to some extent, as a gateway for early retirement. That is, some elderly workers may seek DI benefits to retire early, even if their health status would permit them to continue in the labor force. However, the SAA also led to an increase in employed workers joining the SI program, suggesting that some employed workers with adverse health conditions are denied benefits under the new eligibility criteria. On the other hand, the observed drop in the number of transitions from unemployment to disability, combined with an increase in unemployment persistence, indicates that the DI program may act as unemployment insurance for those that are not disabled but have poor employment prospects. Thus, the high disability rate among older men may not only be the result of program incentives, but may also due to the lack of employment opportunities.

The graphical analysis suggest that the proposed empirical strategy is not simply picking up long-run trends in differences between the control and treat-

Figure 8: Transitions from sick leave: quarter × treatment interaction terms



Notes: This Figure shows coefficients of the quarter × treatment interactions in equation (3) for transitions from sick leave. Dotted lines denote a 95-percent confidence interval.

ment group. There is evidence that the announcement of the reform triggered some anticipation behavior, which would cause an upward bias in the estimates. However, the size of the anticipation effect is small compared to the direct impact of the SAA on labor supply behavior. The comparison group may not be ideal, because the stricter eligibility conditions for DI benefits for the age group 55-56 might result in the general equilibrium effect of potentially feeding back to the labor demand for the age group 49-54. Such spillover effects are likely to be small, given that the labor supply of the control groups displays no change in trend after the SAA is in effect.

6.4 Did the Structural Adjustment Act Reduce Government Expenditures?

The primary objective of the Structural Adjustment Act (SAA) was to reduced expenditures in the public pension system, by encouraging the labor force participation of older male workers. The reform tightened the eligibility criteria for disability benefits for older male workers aged 55 and 56; the main channel for early retirement among elderly men. The results from the empirical analysis presented in the previous sections suggest that the SAA succeeded only partially in achieving this goal.

First, the positive effect on employment was eroded by large spillover effects into the unemployment and sickness insurance programs. Second, even in the absence of spillover effects, there are still doubts that the SAA would have generated large employment effects. In particular, a comparison of transitions between labor force states before and after the reform highlight that the largest inflow to the disability insurance program comes from the unemployment and sickness insurance program, while direct transitions from employment into disability are relatively small. This finding suggests that the low labor force participation of older men is at least partly the result of poor employment prospects, not government program incentives.

Based on the estimation results, one can calculate the impact of the SAA on government expenditures (table 4). According to columns (1) to (3) in table 2 the share of male disability recipients in the age group 55-56 decreased by approximately 5 to 5.7 percentage points after the reform became effective, which corresponds to a drop of approximately 1,421 to 1,632 disability recipients each year (first row in table 4). Given that in the period after the reform the average DI beneficiary receives €308 per week in benefits for a period of 47 weeks per year, the total reduction in averted pension payments ranges from 18.9 to 23.5 million Euros per year. Moreover, as a result of the increase in employment the

SAA generated additional tax revenues between 3.5 to 5.8 million Euros per year.

However, the reform led to an increase of 667 to 894 UI recipients depending on the comparison group and an increase of 143 to 189 SI recipients. Given that the average UI and SI benefits for men aged 55-56 are roughly €190 per year, these spillover effects created 3.7 to 5.2 million Euros per year of additional expenditures in the UI program and 0.4 million Euros per year of additional expenditure in the SI program. Hence, the predicted net reduction in the government budget deficit per year is between 16.9 to 25.2 million Euros.

Table 4: Cost-benefit Analysis

	Disability	Employment	Unemployment	Sickness	
Δ Individuals					
49-50	1,632	779	667	189	
51-52	1,567	547	853	169	
53-54	1,421	407	894	143	
Benefits/Tax	308	196	175	189	
Duration	46.9	43.8	30.4	10	
Δ Total (in Mio. Euros)					Net effect
49-50	23.5	5.8	3.7	0.4	25.2
51-52	21.9	4.7	5.1	0.4	21.1
53-54	18.9	3.5	5.2	0.3	16.9

Notes: Δ individuals is calculated based on the estimates in table 2 and the average cohort size of the treatment group in the period 1997-1999. Weekly benefits are in € and duration is the number of weeks per year spent in the state of interest.

7 Concluding Remarks

Relying on a large policy change in Austria, this paper has analyzed the impact of a tightening in DI eligibility rules on the labor supply of older workers. Similar

to other industrialized countries, the disability insurance program in Austria is an important channel for early retirement, especially because conditions to be classified as disabled are substantially relaxed for older workers aged 55 and above. With the aim of improving the fiscal health of the public pension system, the Austrian government enacted in 1996 the Structural Adjustment Act (SAA). The most significant change of this legislation was a two-year increase in the age, at which eligibility rules for disability benefits are relaxed. Since disability enrollment is particularly high among older men, this increase only applied to men.

Relying on a difference-in-difference approach and using data on the universe of Austrian private sector workers, the empirical analysis suggests that stricter eligibility rules have a significant impact on disability enrollment. Specifically, the share of disability recipients in the affected age group decreased by approximately 5.5 percentage points after the reform was implemented. The empirical analysis also suggests that any change in the disability insurance program may affect enrollment in other government programs that provide income replacement in the case of a separation from the labor market for economic or health reasons. Specifically, the share of individuals receiving unemployment or sick leave benefits increased by 3.5 percentage points, after the SAA became effective. On the other hand, the estimates indicate that the policy change had only modest employment effects; employment increased by roughly 2 percentage points. Hence, accounting for such spillover effects is potentially important for designing effective policies.

While the supply of public benefits is an important factor in the labor force participation of older workers, the demand for such benefits depends crucially on labor–market conditions. An examination of workers' records prior to the inflow into the disability insurance highlights that a large fraction is unemployed before claiming disability benefits. Thus, the modest employment response to the change in eligibility rules for disability benefits may also be the consequence of poor labor market prospects for older workers that are still capable of working.

Improving the employability of older workers is a main policy priority in the face of current demographic changes, and further investigation into how to do so is warranted.

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A Appendix

Table 5: Impact of the SAA on the residual category

	All			Blue			White		
	49-50	51-52	53-54	49-50	51-52	53-54	49-50	51-52	53-54
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post*Age	-0.000	-0.000	-0.001	0.002	0.001	-0.000	0.002	0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	0.006***	0.001*	0.001	0.005***	-0.001	-0.001	0.005***	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cont. yrs	-0.001*	-0.002*	-0.002**	-0.001	-0.002*	-0.003***	-0.001	-0.002*	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Wage	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wage 15yrs	0.009***	0.009***	0.010***	0.009***	0.009***	0.011***	0.009***	0.009***	0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Blue	-0.011***	-0.010***	-0.010***						
	(0.001)	(0.001)	(0.001)						
Exp	-0.239***	-0.253***	-0.239***	-0.114***	-0.121***	-0.105***	-0.114***	-0.121***	-0.105***
	(0.011)	(0.012)	(0.014)	(0.010)	(0.011)	(0.013)	(0.010)	(0.011)	(0.013)
Exp^2	0.083***	0.090***	0.083***	0.041***	0.046***	0.038***	0.041***	0.046***	0.038***
	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)
R^2	1,244,066	1,295,666	1,343,500	746,878	767,252	791,398	746,878	767,252	791,398
Obs.	0.1134	0.1370	0.1394	0.104	0.142	0.144	0.104	0.142	0.144

Notes: The table reports coefficients from a linear probability model. Standard errors in parentheses account for clustering of individual level observations. All models include industry and region dummies. Cont. yrs. indicates the number of contribution years to the pension system. Experience (Exp) is right-censored at 15 years. Wage and Wage 15yrs are measured in €1,000. The time period is 1994-1999. Significance levels: *** = 1%, ** = 5%, * = 10%.